

04/06/98

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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	3168-29779	Total Pages	33
First Named Inventor or Application Identifier			
James M. Kain			
Express Mail Label No.	EM342867554US		

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231
1. <input checked="" type="checkbox"/> Fee Transmittal Form (Submit an original, and a duplicate for fee processing)	6. <input type="checkbox"/> Microfiche Computer Program (Appendix)
2. <input checked="" type="checkbox"/> Specification [Total Pages 19] (preferred arrangement set forth below) <ul style="list-style-type: none">- Descriptive title of the invention- Cross References to Related Applications- Statement Regarding Fed sponsored R & D- Reference to Microfiche Appendix- Background of the invention- Brief Summary of the invention- Brief Description of the Drawings (if filed)- Detailed Description- Claim(s)- Abstract of the Disclosure	7. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) <ul style="list-style-type: none">a. <input type="checkbox"/> Computer Readable Copyb. <input type="checkbox"/> Paper Copy (identical to computer copy)c. <input type="checkbox"/> Statement verifying identity of above copies
3. <input checked="" type="checkbox"/> Drawing(s) (35 USC 113) [Total Sheets 7]	
4. Oath or Declaration (unsigned) [Total Pages 2] <ul style="list-style-type: none">a. <input type="checkbox"/> Newly executed (original or copy)b. <input type="checkbox"/> Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 17 completed) [Note Box 5 below]<ul style="list-style-type: none">i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).	
5. <input type="checkbox"/> Incorporation By Reference (useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.	
ACCOMPANYING APPLICATION PARTS	
8. <input type="checkbox"/> Assignment Papers (cover sheet & document(s))	
9. <input type="checkbox"/> 37 CFR 3.73(b) Statement <input type="checkbox"/> Power of Attorney (when there is an assignee)	
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FEE TRANSMITTALNote: Effective October 1, 1997.
Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT (\$1,186.00)

Complete if Known

Application Number	
Filing Date	Herewith
First Named Inventor	James M. Kain
Group Art Unit	
Examiner Name	
Attorney Docket Number	3168-29779

METHOD OF PAYMENT (check one)

- 1.
- ☐
- The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

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FEE CALCULATION**1. FILING FEE**

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 790	201 395	Utility filing fee	790
106 330	206 165	Design filing fee	
107 540	207 270	Plant filing fee	
108 790	208 395	Reissue filing fee	
114 150	214 75	Provisional filing fee	
SUBTOTAL (1)			(\$ 790)

2. CLAIMS

Total Claims	Extra	Fee from below	Fee Paid
38	-20 = 18	X 22 =	396
Independent Claims	3 - 3 = 0	X 82 =	0
Multiple Dependent Claims		X	

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
103 22	203 11	Claims in excess of 20
102 22	202 41	Independent claims in excess of 3
104 270	204 135	Multiple dependent claim
109 82	209 41	Reissue independent claims over original patent
110 22	210 11	Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$ 396)**FEE CALCULATION (continued)****3. ADDITIONAL FEES**

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 400	216 200	Extension for reply within second month	
117 950	217 475	Extension for reply within third month	
118 1,510	218 755	Extension for reply within fourth month	
128 2,060	228 1,030	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,320	241 660	Petition to revive - unintentional	
142 1,320	242 660	Utility issue fee (or reissue)	
143 450	243 225	Design issue fee	
144 670	244 335	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	
146 790	246 395	Filing a submission after final rejection (37 CFR 1.129(a))	
149 790	249 395	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) _____

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

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PATENT APPLICATION
of
James M. Kain
for
CHILD VEHICLE SEAT WITH CHILD-RESTRAINT
HARNESS ADJUSTMENT MECHANISM
Cosco Case No. CO-592
Attorney Docket 3168-29779

CHILD VEHICLE SEAT WITH
CHILD-RESTRAINT HARNESS ADJUSTMENT MECHANISM

Background and Summary of the Invention

5 The present invention relates to seats for use by children in vehicles and, particularly, to seats having child-restraining harness belts and to seats configured to seat older children in a restrained fashion using adult vehicle lap and shoulder belts. More particularly, the present invention relates to a child vehicle seat with a child-restraint harness adjustment mechanism and to a child vehicle seat with a headrest
10 adjustment mechanism.

 Many child car seats are formed to include several sets of shoulder belt-receiving apertures in a back wall of the car seat so that the car seat can be adapted by a user to restrain children of different sizes. To accommodate an infant, the two shoulder belts are uncoupled from other portions of the car seat harness, passed
15 through a lowest pair of shoulder belt-receiving apertures formed in the back wall of the car seat, and then recoupled to the car seat harness.

 As the infant grows, the caregiver must repeat the belt installation procedure described above using other higher sets of belt-receiving apertures formed in a higher portion of the back wall of the car seat to enlarge the child car seat harness to
20 accommodate the growing child. Many caregivers would welcome a car seat that is adaptable to hold infants, toddlers, and juveniles and, in particular, is adaptable to adjust the size of the child-restraint harness quickly and easily to accommodate children of various sizes in the child car seat.

 In accordance with the present invention, a child-restraint seat includes
25 a seat adapted to seat a child, a child-restraint harness, and a harness-control panel formed to include a belt-receiving opening receiving a shoulder belt portion of the child-restraint harness. The harness-control panel is mounted on the seat shell for up and down movement relative to the seat to raise and lower the shoulder belt portion of the child-restraint harness with respect to a bottom seat portion of the seat so as to
30 harness both small-sized and large-sized children properly in a restrained position in the seat.

In preferred embodiments, the movable harness-control panel includes a back plate formed to include two horizontally extending spaced-apart slots and two support arms. A forward end of each support arm is coupled to the back plate and the rearward end of each support arm passes through one of two guide slots formed in a back support portion of the seat to guide up and down movement of the harness-control panel relative to the seat. A height-adjustment apparatus is coupled to the rearward ends of the support arms and operated to move the harness-control panel up and down relative to the seat to one of several predetermined heights above the bottom seat portion defined by position locator slots formed on a rearward side of the back support portion.

The back support portion is formed to include two slanted channels positioned to lie behind the back panel and between the guide slots. The two slanted channels are aligned in V-shaped relation to communicate with the two slots formed in the back plate during up and down movement of the back plate relative to the seat.

Movement of the harness-control panel simultaneously controls the height of two shoulder belts included in the child-restraint harness above the bottom seat portion and lateral spacing between the two shoulder belts. The two shoulder belts should be higher above the bottom seat portion and farther apart from one another to harness a larger-sized child in a seat properly. The same two shoulder belts should be closer to the bottom seat portion and closer to one another to harness a smaller-sized child properly in the same seat.

A middle portion of the first shoulder belt passes through a first slot in the back panel and a matching first slanted channel in the back support portion and connects to the height-adjustment apparatus. Likewise, a middle portion of the second shoulder belt passes through a second slot in the back panel and a matching second slanted channel in the back support portion and connects to the height-adjustment apparatus. By operating the height-adjustment apparatus it is possible at the option of a caregiver either to raise the back panel higher above the bottom seat portion, thereby raising the shoulder belts higher and spreading the shoulder belts farther apart so as to accommodate and harness a larger-sized child or to lower the back panel closer to the bottom seat portion, thereby moving the shoulder belts lower and bringing the shoulder belts closer together so as to accommodate and harness a smaller-sized child.

Additional features and advantages of the invention will become apparent to those skilled in the art upon consideration of the following detailed description of preferred embodiments exemplifying the best mode of carrying out the invention as presently perceived.

5

Brief Description of the Drawings

The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a front perspective view of a seat including a seat shell, a child-restraint harness coupled to the seat shell, and a harness-control panel movable up and down relative to the seat shell (in a position behind a child seated in the seat shell) to adjust the height of shoulder belts included in the child-restraint harness relative to a bottom seat portion in the seat shell to adapt the seat for use by both small-sized and large-sized children;

Fig. 2 is a rear perspective view of the seat of Fig. 1 showing two shoulder belts in the child-restraint harness extending along a back side of the seat shell and engaging a horizontal belt support bar included in a panel height-adjustment mechanism coupled to the harness-control panel and the seat shell through an opening formed in the seat shell and showing a slotted vertical support bar anchor member coupled to the back side of the seat shell and a bar release (pull) handle included in the panel height-adjustment mechanism;

Fig. 3 is a vertical sectional view of the seat of Figs. 1 and 2 taken along line 3-3 of Fig. 2 showing the child-restraint harness coupled to the seat shell and panel height-adjustment mechanism to restrain a child (shown in phantom) seated in the seat and showing the harness-control panel positioned to lie in a lowest one of four available positions (with the shoulder belts passing therethrough) and retained in such a position by the panel height-adjustment mechanism;

Fig. 4 is a transverse sectional view taken along line 4-4 of Fig. 3 showing a back support portion of the seat shell positioned to lie between the movable harness-control panel and the panel height-adjustment mechanism and showing the two shoulder belts extending through openings formed in the harness-control panel and back support portion to engage the spring-biased horizontal belt support bar included

in the panel height-adjustment mechanism and to lie on opposite sides of the slotted vertical bar anchor member and a bar release handle;

Fig. 5 is a front elevation view of an upper portion of the seat of Figs. 1-4 showing the harness-control panel in a lowest position within the seat shell;

5 Fig. 6 is a rear elevation view of the upper portion of the seat shown in Fig. 5 showing the two shoulder belts, the horizontal belt support bar, the bar release (pull) member coupled to the horizontal belt support bar, and the slotted vertical support bar anchor positioned to engage a middle portion of the horizontal belt support bar,

10 Figs. 7-9 show a sequence of steps in which the bar release (pull) handle is moved and the panel height-adjustment mechanism is operated to raise the harness-control panel from a lowest position (in which the horizontal belt support bar engages a first slot formed in the vertical bar anchor member) to a next highest position (in which the horizontal belt support bar engages a second slot formed in the vertical bar anchor member);

15 Fig. 7 is a sectional view taken along line 7-7 of Fig. 6 showing the horizontal belt support bar retained in the first slot formed in the vertical bar anchor member by the bar release handle (in solid) and showing (in phantom) movement of the bar release handle nearly to disengage the horizontal belt support bar from the first slot;

20 Fig. 8 is a sectional view similar to Fig. 7 showing upward movement of the harness-control panel relative to the seat shell due to raising of the horizontal belt support bar by a user lifting up on the bar release handle;

25 Fig. 9 is a sectional view similar to Figs. 7 and 8 showing engagement of the horizontal belt support bar in a second slot to establish a fixed raised position of the harness-control panel relative to the seat shell above the lowest position shown in Figs. 1-7 and showing that the shoulder belts pass through the seat shell when the harness-control panel occupies its second position at a point that is higher than the seat shell entry point of the shoulder belts when the harness-control panel occupies its lowest position shown, for example, in Fig. 5-6;

30 Fig. 10 is a front elevation view similar to Fig. 5 showing the harness-control plate in its second position (corresponding to the position shown in Fig. 9);

Fig. 11 is a rear elevation view similar to Fig. 6 showing the upper portion of the seat shown in Fig. 10 wherein the horizontal belt support bar engages the second slot formed in the vertical bar anchor member;

Fig. 12 is a front elevation view similar to Figs. 5 and 10 showing the harness-control plate in a third position raised above the second position shown in Fig. 10;

Fig. 13 is a rear elevation view similar to Figs. 6 and 11 showing the upper portion of the seat shown in Fig. 12 wherein the horizontal belt support bar engages a third slot formed in the vertical bar anchor member;

Fig. 14 is a front perspective view of the seat of Fig. 1 showing the harness-control plate fixed in a fourth position relative to the seat shell to position a headrest appended to the harness-control plate at a highest elevation above the bottom seat portion of the seat and showing that no child-restraint harness is coupled to the seat because, in this position, the seat is adapted to be used with an existing adult seat belt restraint system provided in a vehicle in which the seat is used to support a child;

Fig. 15 is a front elevation view similar to Figs. 5, 10, and 12 of the seat of Fig. 14 showing the harness-control plate in the fourth position and showing that the two belt-receiving apertures formed in the harness-control plate are spaced apart from the two slanted belt-receiving apertures (shown in phantom) formed in the seat shell;

Fig. 16 is a rear elevation view similar to Figs. 6, 11, and 13 showing the upper portion of the seat shown in Figs. 14 and 15 wherein the horizontal belt support bar engages a fourth slot formed in the vertical bar anchor member; and

Figs. 17-20 are views of a second embodiment of a seat including a three-point harness coupled to a pivotable restraint shield, which views are similar to Figs. 1-4, respectively

Detailed Description of the Drawings

A seat 10 includes a seat shell 12, a base 14, and a pivotable leg 16 as shown in Figs. 1-3. Seat shell 12 and base 14 are molded out of plastics material to form a child-supporting seat. Seat 10 can be converted for use as a forward-facing seat or a rearward-facing seat by movement of pivotable support leg 16 relative to base

14. Although seat shell 12 is a one-piece molded body in the illustrated embodiment, it is within the scope of the present invention to use a multiple-piece body.

Seat shell 12 includes a bottom seat portion 18 adapted to support a child's bottom and upper legs and a back support portion 20 positioned to lie at an angle to bottom seat portion 18. First and second side wall portions 22, 24 are provided for preventing lateral movement of the child in seat 10 and lie on opposite sides of bottom seat portion 18. A cushion or seat cover (not shown) can cover bottom and/or back support portions 18, 20 for added comfort.

A harness 26 including shoulder belts 28, 30, a lower belt 32, and a buckle unit 34 is provided for further restraining a child's movement relative to seat shell 12 as shown in Figs. 1 and 3. A harness retainer 36 is used to hold shoulder belts 28, 30 together as shown in Fig. 1. One end of lower belt 32 is coupled to shoulder belts 28, 30 by a junction member 33 and another end of lower belt 32 is coupled to seat 10 by a belt adjustment mechanism 35 as shown in Fig. 3. Buckle unit 34 includes a frame 38 selectively coupled to a connector 39 on bottom seat portion 18, a buckle 40 coupling first shoulder belt 28 to frame 38, and a buckle 42 coupling second shoulder belt 30 to frame 38. Seat 10 can be adapted to receive other harnesses (not shown) and a combination of a harness and a movable barrier shield as shown, for example, in Figs. 17-20.

As shown, for example, in Fig. 2, seat 10 includes first and second vertical back ribs 44, 46 appended to back support portion 20 and positioned to lie in spaced-apart relation to one another to define a space 48 therebetween. Seat 10 also includes a horizontal back rib 50 appended to back support portion 20 and positioned to interconnect upper ends of vertical back ribs and define an upper boundary of space 48. Each vertical back rib 44, 46 is formed to include a vehicle belt channel 52 for receiving a vehicle lap belt 51 when seat 10 is restrained on a vehicle seat 53 in a forward-facing position as shown, for example, in Fig. 3.

A harness-control panel 54 is positioned to lie in a child-receiving space 56 defined in a front portion of seat 10 and is mounted for up-and-down movement relative to bottom seat portion 18 in seat 10 as shown best in Figs. 1, 4, 5, 7-10, 12, 14, and 15. Up-and-down movement of harness-control panel 54 functions to raise and lower the "height" of shoulder belts 28, 30 above bottom seat portion 18 and to

adjust the "lateral spacing" of shoulder belts 28, 30 relative to one another to adapt seat 10 to accommodate young, small-sized children or older, larger-sized children.

Harness-control panel 54 includes a back plate 58 formed to include shoulder belt-receiving slots 94, 96, a headrest 60 provided in an upper portion of back plate 58 above slots 94, 96, and first and second wing members 62, 64 coupled to opposite edges of back plate 58 and positioned to lie in spaced-apart relation to one another. Each wing member 62, 64 is oriented to lie at an angle relative to back plate 58 as shown, for example, in Figs. 1 and 4. Up-and-down movement of harness-control panel 54 also functions to raise and lower the height of headrest 60 above bottom seat portion 18 to adapt seat 10 to accommodate young, small-sized children or older, larger-sized children. As shown, for example, in Figs. 5, 10, and 12, the shoulder belts 28, 30 and headrest 60 move up and down together relative to seat shell 12 and shoulder belts 28, 30 move together and apart during movement of harness-control panel 54 to assure proper shoulder belt fit for a child seated in seat 10.

As shown best in Figs. 3, 4, and 6, harness-control panel 54 includes a first support arm 66 having a front end 68 coupled to back plate 58 and first wing member 62 and a rear end 70 passing through a first vertical guide slot 72 formed in seat shell 12 to extend into space 48 between first and second vertical back ribs 44, 46. Harness-control panel 54 also includes a second support arm 74 having a front end 76 coupled to back plate and second wing member 64 and a rear end 78 passing through a second vertical guide slot 80 formed in seat shell 12 to extend into space 48. Guide slots 72, 80 are formed in back support portion 20 of seat shell 12 to lie in spaced-apart parallel relation to one another. First guide slot 72 is also formed in first vertical back rib 44 and second guide slot 80 is also formed in second vertical back rib 46 as shown best in Figs. 4 and 6. First support arm 66 reciprocates in first guide slot 72 and second support arm 66 reciprocates in second guide slot 80 as harness-control panel 54 moves up and down relative to back support portion 20 between a lowest position (shown, for example, in Figs. 1, 3, and 5) adapted to suit a young, small-sized child and a highest position (shown, for example, in Figs. 14-16) adapted to suit an older, larger-sized child.

Back support portion 20 of seat shell 12 and back plate 58 of movable harness-control panel 54 are configured to cooperate to set the nominal height 82 (See

Fig. 3) of first and second shoulder belts 28, 30 above bottom seat portion 18 of seat shell 12 and to set the nominal lateral spacing between the first and second shoulder belts 28, 30 so as to adapt seat 10 to accommodate either a young, smaller-sized child or an older, larger-sized child at the option of a child caregiver using seat 10. A
 5 caregiver can raise and lower harness-control panel 54 easily to change the height and lateral spacing of first and second shoulder belts 28, 30.

Back support portion 20 is formed to include two vertical slanted channels 84, 86 shown, for example, in Figs. 1 and 3 (phantom) and in Figs. 2 and 4 (solid). The slanted channels 84, 86 are aligned in spaced-apart diverging relation
 10 (lowest end to highest end) to lie "behind" back plate 58 of harness-control panel 54 so that first shoulder belt 28 can pass through first slanted channel 84 and second shoulder belt 30 can pass through second slanted channel 86. As shown in Fig. 5, a first distance 88 separates the lowest end of slanted channels 84, 86 and a longer, second distance 90 separates the highest end of slanted channels 84, 86. The slanted
 15 channels 84, 86 are arranged to lie in a somewhat V-shaped pattern.

Harness-control panel 54 is formed to include a pair of spaced-apart horizontally extending, elongated, belt-receiving slots 94, 96 as shown, for example, in Figs. 1 and 5. Each slot 94, 96 has a length 92 that is greater than the nominal width
 97 (Fig. 5) of a companion one of the slanted channels 84, 86.

20 First slot 94 is sized to receive a portion of first shoulder belt 28 and allow the portion of first shoulder belt 28 also to pass through first slanted channel 84. First slanted channel 84 formed in back support portion 20 is arranged to lie in communication with belt-receiving slot 94 formed in harness-control panel 54 to enable movement of a portion of first shoulder belt 28 in slot 94 and slanted channel 84
 25 during up and down movement of harness-control plate 54 relative to seat shell 12.

Second slot 96 is sized to receive a portion of second shoulder belt 30 and allow the portion of second shoulder belt 30 also to pass through second slanted channel 86. Second slanted channel 86 formed in back support portion 20 is arranged to lie in communication with belt-receiving slot 96 formed in harness-control panel 54
 30 to enable movement of a portion of second shoulder belt 30 in slot 96 and slanted channel 96 during up and down movement of harness-control plate 54 relative to seat shell 12.

The height of harness-control panel 54 above bottom seat portion 18 determines the nominal height 82 (i.e. seat shell entry point) of the first and second shoulder belts 28. Seat 10 can be adjusted to accommodate young, small-sized children by moving harness-control panel 54 to its lowest position shown, for example, in Figs. 1, 3, and 5 to minimize nominal height 82 and cause the seat shell entry points of shoulder belts 28, 30 to be lowered. In this position, it is contemplated that harness 26 will be used to restrain a young, small-sized child seated in seat 10 as shown in Fig. 3. Seat 10 can also be adjusted to assume other positions shown in Figs. 10 and 12 to accommodate somewhat older, larger children in seat 10 by raising harness-control panel 54 upwardly in direction 98 relative to back support portion 20 of seat shell 12 to increase nominal height 82 and cause the seat shell entry point of shoulder belts 28, 30 to be raised.

The slanted channels 84, 86 formed in fixed back support portion 20 are sized, angled, and otherwise arranged so that they cooperate with belt-receiving slots 94, 96 formed in movable harness-control panel 54 to move the shoulder belts 28, 30 close to one another as shown in Fig. 5 (separated only by short lateral distance 88) when the harness-control panel 54 occupies a "low position" suitable for young, small-sized children and to move the shoulder belts 28, 30 farther apart from one another as shown in Fig. 12 (separated by a longer lateral distance 90) when the harness-control panel 54 occupies a "high position" suitable for older, larger children. As shown in Fig. 10, slanted channels 84, 86 and belt-receiving slots 94, 96 cooperate to move shoulder belts 28, 30 to a position separated by a lateral distance 91 that is less than long lateral distance 90 but greater than short lateral distance 88 when the harness-control panel 54 occupies a "middle position" suitable for middle-sized children. As shown in Figs. 5, 10, and 12, the slant angles (with respect to the vertical) of slanted channels 84, 86 and the lateral length of belt-receiving slots 94, 96 cooperate to define a pair of shoulder belt-receiving apertures that effectively move closer together or farther apart in response to lowering and raising of harness-control panel 54 relative to back support portion 20.

Seat 10 can also be adjusted to accommodate even older, larger-sized children by moving harness-control panel 54 to its highest position shown, for example, in Figs. 14-16. In this position, it is contemplated that harness 26 will be

removed from seat 10 (or tucked in an out-of-the-way, unused position) and that an adult three-point vehicle lap/shoulder belt (not shown) will be used to restrain a child seated in seat 10. In its highest position, harness-control panel 54 is used primarily to support headrest 60 in a proper elevated position relative to bottom seat portion 18.

- 5 Harness-control panel 54 is not used to control the seat shell entry points of shoulder belts 28, 30 since those belts are not used to restrain a child in seat 10 in such a configuration. As such belt-receiving slot 94 does not communicate with first slanted channel 84 and belt-receiving slot 96 does not communicate with second slanted channel 86 when harness-control panel 54 and its headrest 60 is positioned in its
10 highest position as shown, for example, in Figs. 14-16.

- A panel height-adjustment mechanism 110 is included in seat 10 and operable to control the height of harness-control panel 54 relative to bottom seat portion 18. Panel height-adjustment mechanism 110 includes a belt support bar 112, a first bar-mounting block 114 coupled to rear end 70 of first harness-control plate support arm 66 for movement therewith, a second bar-mounting block 116 coupled to rear end 78 of second harness-control plate support arm 74 for movement therewith, and a bar release member 118 coupled to belt support bar 112.
15

- A vertical bar anchor member 120 is coupled to a rear side of back support portion 20 to lie in space 48 midway between first and second vertical back ribs 44, 46. In a presently preferred embodiment, an upper end of vertical bar anchor member 120 is coupled to a mid-portion of horizontal back rib 50. Vertical bar anchor member 120 is formed to include a plurality of panel height locators such as vertically spaced-apart slots (e.g. slots 122, 124, 126, and 128), each slot for receiving belt support bar 112 therein to establish a fixed position of first and second support arms 66, 74 (and harness-control panel 54 coupled to those support arms 66, 74) relative to the underlying bottom seat portion 18 of seat shell 12. Slot 122 is located to define a "lowest" position of harness-control panel 54 as shown in Figs. 1-7. Slot 124 is located to define a "middle" position of harness-control panel 54 as shown in Figs. 9-11. Slot 126 is located to define a "high" position of harness-control panel 54 as shown in Figs. 12 and 13. Slot 128 is located to define a "highest" position of harness-control panel 54 as shown in Figs. 14-16 wherein an older, larger sized child is
20
25
30

restrained in seat 10 using an adult vehicle shoulder and lap belt assembly rather than using child-restraint harness 26 provided in seat 10.

Each of the first and second bar-mounting blocks 114, 116 is formed to include a somewhat horizontal guide channel 130 for receiving one end (or a portion) of belt support bar 112 therein and supporting belt support bar 112 for back-and-forth sliding movement as belt support bar 112 is moved into and out of any of the slots 122, 124, 126, and 128 formed in vertical bar anchor member 120 during movement of harness-control panel 54 relative to seat shell 12. A spring 132 is positioned in each of the first and second bar-mounting blocks 114, 116 and arranged to urge belt support bar 112 in a direction toward back support portion 20 so as to cause belt support bar 112 to be retained in one of the slots 122, 124, 126, 128 formed in vertical bar anchor member 120 upon movement of belt support member 112 into such a slot. As shown in the drawings, shoulder belts 28, 30 are positioned to wrap around belt support member 112 and lie on opposite sides of vertical bar anchor member 120 and bar release member 118 so that any raising or lowering of belt support member 112 relative to vertical bar anchor member 120 (and its slots 122, 124, 126, and 128) will change the nominal height 82 (and seat shell entry point) of the first and second shoulder belts 28, 30.

Bar release member 118 includes a first arm 134 coupled to belt support member 112 and positioned to lie on one side of vertical bar anchor member 120 and a second arm 136 coupled to belt support member 112 and positioned to lie on an opposite side of vertical bar anchor member 120 in spaced-apart relation to first arm 134. Bar release member 118 also includes a grip handle 137 interconnecting outer ends of first and second arms 134, 136. First and second arms 134, 136 include cam faces 138 for acting against a rear wall 140 of back support portion 20 as shown, for example, in Fig. 7 to move belt support member 112 from an engaged position in slot 122 formed in bar anchor member 120 to a position disengaging slot 122. Then, as shown in Figs. 8 and 9, a user can move bar release member 118 relative to bar anchor member 120 to engage one of the other slots 124, 126, or 128 formed in bar anchor member 120 to change the nominal height 82 (seat shell entry point) of the two shoulder belts 28, 30 so as to adapt seat 10 to be used by children of various sizes.

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Bar release member 118 is an adjusting handle that has a cam rotation system to make the spring-loaded belt support member 112 easier to adjust. The steel bar support member 112 acts as a cam pivot when bar release member 118 is rotated to urge cam faces 138 into camming engagement with rear wall 140. Such camming
5 action moves bar support member 112 to an outward position disengaging the slots in bar anchor member 120 so that bar support member 112 and the shoulder belts 28, 30 supported thereon can be moved up or down. Side walls 131, 133 of bar anchor member 120 engage first and second arms 134, 136 of bar release member 118 to keep bar release member 118 in proper lateral alignment as it is moved up and down on
10 vertical bar anchor member 120.

A seat 210 is shown in Figs. 17-20. Seat 210 is similar in most respects to seat 10. However, seat 210 includes a pivotable swing arm unit 212 for restraining forward movement of a child in seat 210. Swing arm unit 212 includes a barrier shield 214, a left swing arm 216 coupled to one end of barrier shield 214, and a right swing
15 arm 218 coupled to another end of barrier shield 214. Left swing arm 216 is pivotably coupled to one side of seat shell 12 and right swing arm 218 is pivotably coupled to another side of seat shell 12. Shoulder belts 28, 30 are coupled at one end to a strap 31 that is coupled to a buckle unit 234 that can be selectively coupled to connector 39 on bottom seat portion. Strap 31 is also coupled to barrier shield 214.

20 Although this invention has been described in detail with reference to certain embodiments, variations and modifications exist within the scope and spirit of the invention as described and defined in the following claims.

Claims

1. A child-restraint seat comprising
a seat shell including a bottom seat portion,
5 a child-restraint harness coupled to the seat shell, and
a harness-control panel formed to include a belt-receiving opening
receiving a shoulder belt portion of the child-restraint harness, the harness-control
panel being mounted on the seat shell for up and down movement relative to the seat
shell to raise and lower the shoulder belt portion of the child-restraint harness with
10 respect to the bottom seat portion to harness small-sized children and large-sized
children in a restrained position in the seat shell.
2. The child-restraint seat of claim 1, wherein the harness-control
plate includes a back plate formed to include first and second spaced-apart slots
defining the belt-receiving opening, the shoulder belt portion of the child-restraint
15 harness includes first and second shoulder belts, the seat shell further includes a back
support portion positioned to lie at an angle to the bottom seat portion and formed to
include first and second slanted channels aligned in spaced-apart diverging relation to
lie behind the back plate so that the first shoulder belt passes through the first slot and
first slanted channel and the second shoulder belt passes through the second slot and
20 second slanted channel during up and down movement of the harness-control panel
relative to the seat shell.
3. The child-restraint seat of claim 2, wherein the first slanted
channel has a nominal width and the first slot has a length that is greater than the
nominal width of the first slanted channel.
- 25 4. The child-restraint seat of claim 2, wherein the back support
portion is formed to include two guide slots arranged in spaced-apart relation to
position the first and second slanted channels therebetween, the harness-control panel
further includes two support arms coupled to the back plate, and each of the support
arms is arranged to extend through one of the guide slots.
- 30 5. The child-restraint seat of claim 4, further comprising means
coupled to the support arms and to the back support portion for moving the back plate

and the first and second shoulder belts received in the first and second slots formed in the back plate up and down relative to the seat shell.

6. The child-restraint seat of claim 2, wherein the harness-control plate further includes a headrest provided in an upper portion of the back plate above
5 the first and second spaced-apart slots and adapted to extend above an upper edge of the back support portion upon removal of the first and second shoulder belts from the first and second spaced-apart slots and the first and second slanted channels and movement of the harness-control panel to a highest position relative to the seat shell.

7. The child-restraint seat of claim 6, wherein the first and second
10 spaced-apart slots are located in a position below the headrest to lie in spaced-apart relation to the first and second slanted channels upon movement of the harness-control panel to the highest position relative to the seat shell.

8. The child-restraint seat of claim 1, wherein the seat shell is formed to include a back support portion positioned to lie at an angle to the bottom
15 seat portion and formed to include a guide slot and the harness-control panel includes a back plate formed to include the belt-receiving opening and adapted to face toward a child seated in the seat shell and a support arm coupled to the back plate and arranged to extend through the guide slot and reciprocate up and down therein as the back plate moves up and down relative to the back support portion between a low position
20 adapted to suit a small-sized child and a higher position adapted to suit a larger-sized child.

9. The child-restraint seat of claim 8, wherein the back support portion is also formed to include a slanted channel oriented to lie at an angle to the guide slot and arranged to receive the portion of the child-restraint harness therein and
25 lie in communication with the belt-receiving opening formed in the back plate to enable movement of the portion of the child-restraint harness in the belt-receiving opening formed in the back plate and the slanted channel formed in the back support portion during up and down movement of the back plate relative to the seat shell.

10. The child-restraint seat of claim 9, wherein the slanted channel
30 in the back support portion has a nominal width and the belt-receiving opening in the back plate is a slot having a length that is greater than the nominal width of the slotted channel.

11. The child-restraint seat of claim 8, wherein the back support portion is formed to include two spaced-apart guide slots and the harness-control panel includes two support arms coupled to the back plate and each support arm is arranged to extend through one of the guide slots.

5 12. The child-restraint seat of claim 8, wherein the harness-control panel includes first and second wing members coupled to opposite edges of the back plate and positioned to lie in spaced-apart relation to one another and the support arm is also coupled to one of the first and second wing members

10 13. The child-restraint seat of claim 8, wherein the seat shell further includes a vertical back rib appended to the back support portion to position the back support portion between the harness-control panel and the vertical back rib and the vertical back rib is formed to include the guide slot.

15 14. The child-restraint apparatus of claim 1, wherein the seat shell further includes a back support portion positioned to lie at an angle to the bottom seat portion and further comprising means coupled to the back support portion for moving the harness-control panel up and down relative to the bottom seat portion.

20 15. The child-restraint apparatus of claim 14, wherein the moving means includes panel height locators coupled to the back support portion at different elevations above the bottom seat portion and means coupled to the harness-control panel for engaging a selected one of the panel height locators to establish a selected elevation of the harness-control panel and the shoulder belt portions of the child-restraint harness received in the belt-receiving opening formed in the harness-control panel above the bottom seat portion.

25 16. The child-restraint apparatus of claim 15, wherein the back support portion is formed to include an opening therein and the harness-control panel includes a back plate formed to include the belt-receiving opening and at least one support arm coupled to the back plate and to the engaging means and arranged to extend through the opening formed in the back support portion.

30 17. The child-restraint apparatus of claim 15, wherein the back support portion includes a front side facing toward a child seated in the seat shell and an opposite rear side, an anchor member is appended to the rear side and formed to include a plurality of vertically spaced-apart slots, and each slot defines one of the

panel height locators and is configured to receive a portion of the engaging means therein.

18. The child-restraint seat of claim 1, wherein the seat shell includes a back support portion positioned to lie at an angle to the bottom seat portion
5 and formed to include at least two position locator slots and further comprising a belt support member engaging the child-restraint harness and a bar release member mounted for movement on the belt support member and formed to include a cam face arranged to act against the back support portion to disengage the belt support member from one of the at least two position locator slots in response to movement of the bar
10 release member relative to the belt support member.

19. The child-restraint seat of claim 18, wherein the bar release member includes first and second arms coupled to the belt support member and a grip handle interconnecting outer ends of the first and second arms.

20. The child-restraint seat of claim 19, wherein each of the first and
15 second arms also includes an inner end positioned to lie adjacent to the back support portion and the cam face includes a cam surface formed on the inner end of each of the first and second arms.

21. The child-restraint seat of claim 19, wherein the seat shell further includes a bar anchor member coupled to the back support portion and formed
20 to include the position locator slots and the first and second arms are positioned to lie in spaced-apart relation to locate the bar anchor member therebetween.

22. The child-restraint apparatus of claim 19, further comprising a spring urging the belt support member into one of the at least two position locator slots and compressing during movement of the bar release member on the belt support
25 member to disengage the belt support member from one of the at least two position locator slots.

23. A child-restraint seat comprising
a seat back formed to include first and second slanted channels aligned in spaced-apart diverging relation,
30 a harness-control plate including a back plate formed to include a first slot communicating with the first slanted channel and a second slot communicating with the second slanted channel,

a child-restraint harness including a first shoulder belt passing through the first slot and slanted channel and a second shoulder belt passing through the second slot and slanted channel, and

means for moving the harness-control plate up and down relative to the
 5 seat back to move the first and second shoulder belts passing through the first and second slots in the first and second slanted channels up and down relative to the seat back to accommodate small-sized and large-sized children.

24. The child-restraint seat of claim 23, wherein the moving means includes a belt support bar arranged to lie behind the seat back to position the seat
 10 back between the harness-control plate and the belt support bar and the first and second shoulder belts exit the first and second slanted channels to engage the belt support bar.

25. The child-restraint seat of claim 24, wherein the seat back is formed to include a guide slot, the harness-control panel further includes a support arm
 15 coupled to the back plate and to the belt support bar to move therewith and arranged to pass through the guide slot formed in the seat back.

26. The child-restraint seat of claim 25, wherein the seat back includes at least two position locator slots oriented to receive the belt support bar therein and the moving means includes at least one spring arranged to urge the belt
 20 support bar into one of the position locator slots upon movement of the belt support bar to lie in confronting relation therewith and bar release means for selectively moving the belt support bar against the at least one spring to disengage the one of the position locator slots to enable a user to move the belt support bar up and down relative to the seat back, thereby moving the harness-control panel and the first and second shoulder
 25 belts up and down relative to the seat back.

27 The child-restraint seat of claim 23, wherein the harness-control plate further includes a headrest provided in an upper portion of the back plate above the first and second spaced-apart slots and adapted to extend above an upper edge of the seat back upon removal of the first and second shoulder belts from the first and
 30 second spaced-apart slots and the first and second slanted channels and movement of the harness-control panel to a highest position relative to the seat shell.

28. The child-restraint seat of claim 27, wherein the first and second spaced-apart slots are located in a position below the headrest to lie in spaced-apart relation to the first and second slanted channels upon movement of the harness-control panel to the highest position relative to the seat shell.

5 29. A child-restraint seat comprising
a seat back formed to include first and second slanted channels aligned in spaced-apart diverging relation and formed to include a guide slot,

a harness-control plate including a back plate formed to include a first slot communicating with the first slanted channel and a second slot communicating
10 with the second slanted channel, the harness-control plate including a support arm appended to the back plate and extending therefrom through the guide slot,

a child-restraint harness including a first shoulder belt passing through the first slot and slanted channel and a second shoulder belt passing through the second slot and slanted channel,

15 an anchor member coupled to the seat back and formed to include at least two panel height locators, and

a panel-adjustment assembly coupled to the support arm and including a locking member that is movable relative to the support arm between a first position engaging one of the at least two panel height locators to prevent the harness-control
20 plate from moving relative to the seat back and a second position disengaged from the at least two panel height locators to allow the harness-control plate to move up and down relative to the seat back to move the first and second shoulder belts passing through the first and second slots and passing through the slanted channels up and down relative to the seat back to accommodate small-sized and large-sized children.

25 30. The child-restraint seat of claim 29, wherein the guide slot is a first guide slot, the seat back includes a second guide slot, and the first and second slanted channels are positioned to lie between the first and second guide slots.

31. The child-restraint seat of claim 30, wherein the anchor member is positioned to lie between the first and second slanted channels.

30 32. The child-restraint seat of claim 30, wherein the harness-control plate includes a second support arm appended to the back plate and extending

therefrom through the second guide slot and the locking member extends between the first and second support arms.

33. The child-restraint seat of claim 32, wherein the locking member is biased with respect to the first and second support arms toward the anchor member.

5 34. The child-restraint seat of claim 32, wherein the panel adjustment assembly includes a grip handle coupled to the locking member and movable to move the locking member between the first and second positions.

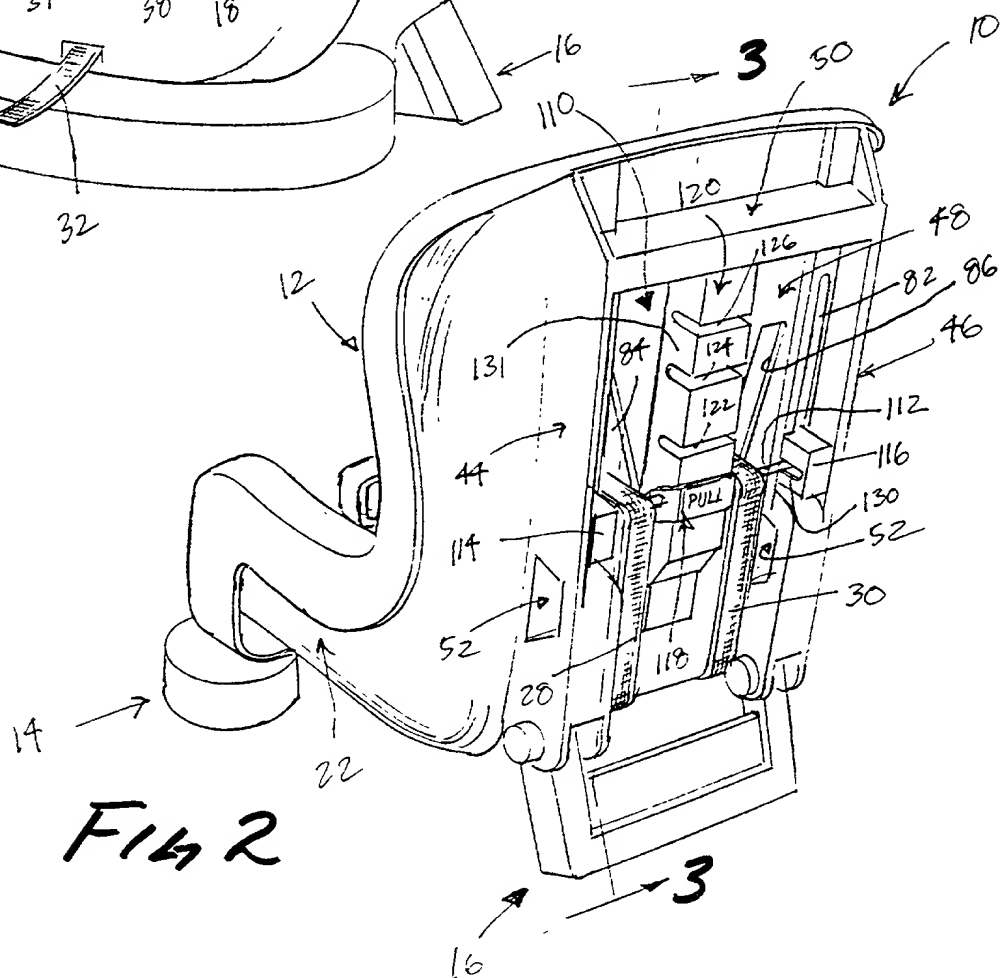
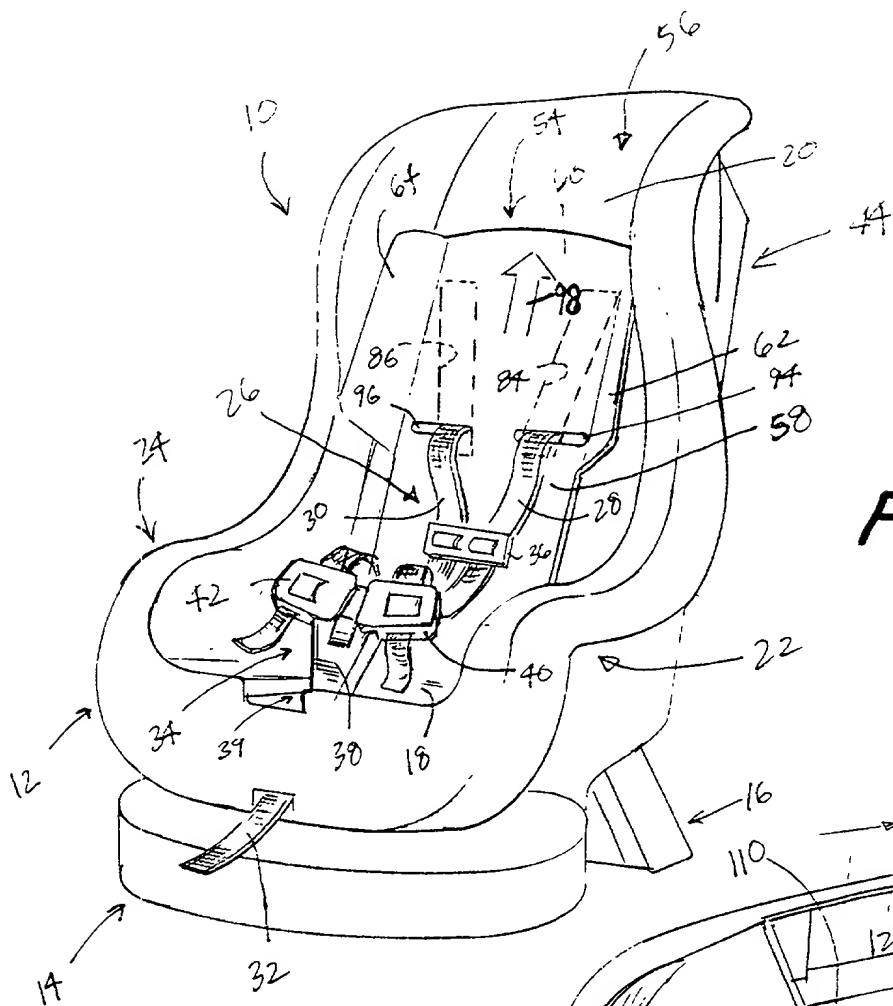
35. The child-restraint seat of claim 29, wherein the anchor member is a vertical rib, the locking member is a bar, and the vertical rib is formed to include a pair of bar-receiving slots that define the at least two panel height locators.

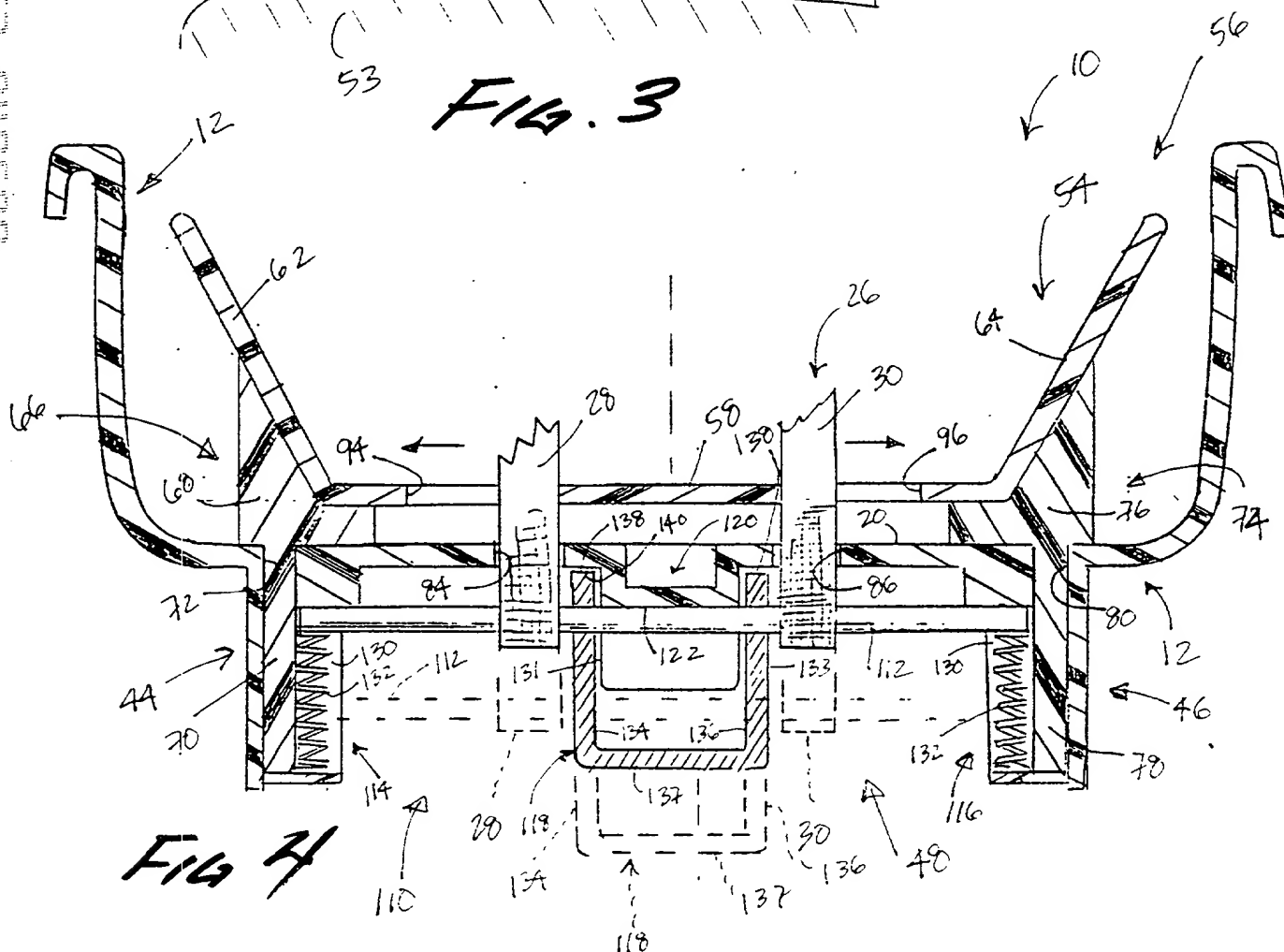
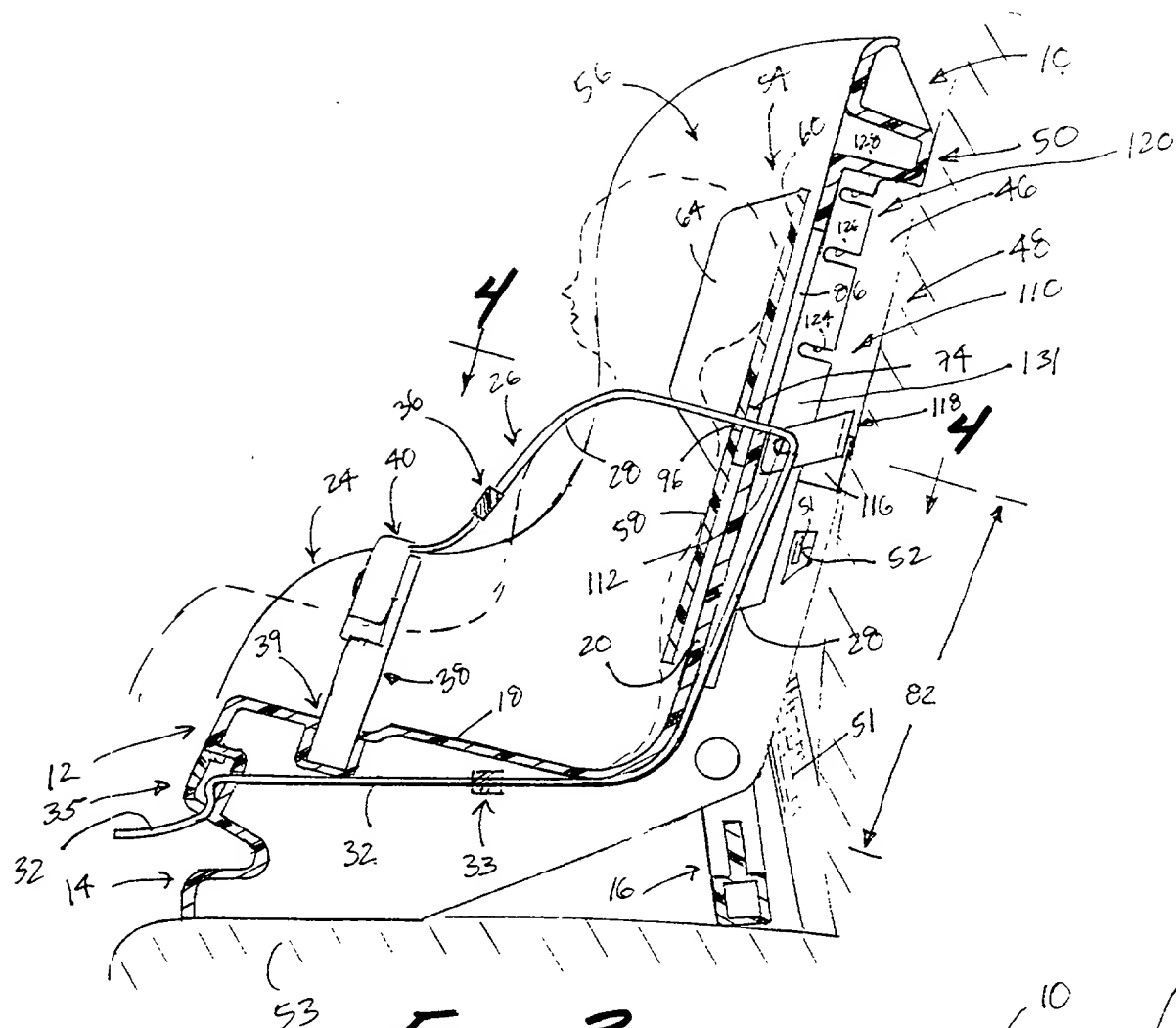
10 36. The child-restraint seat of claim 35, wherein the first and second shoulder belts each include respective portions that engage the bar.

37. The child-restraint seat of claim 35, wherein the bar is biased with respect to the support arm toward the vertical rib.

15 38. The child-restraint seat of claim 35, wherein the panel adjustment assembly includes a handle coupled to the bar for pivoting movement, the handle includes a cam face positioned in camming engagement with the seat back, and the cam face is shaped so that pivoting movement of the handle relative to the bar causes the bar to move between the first and second positions.

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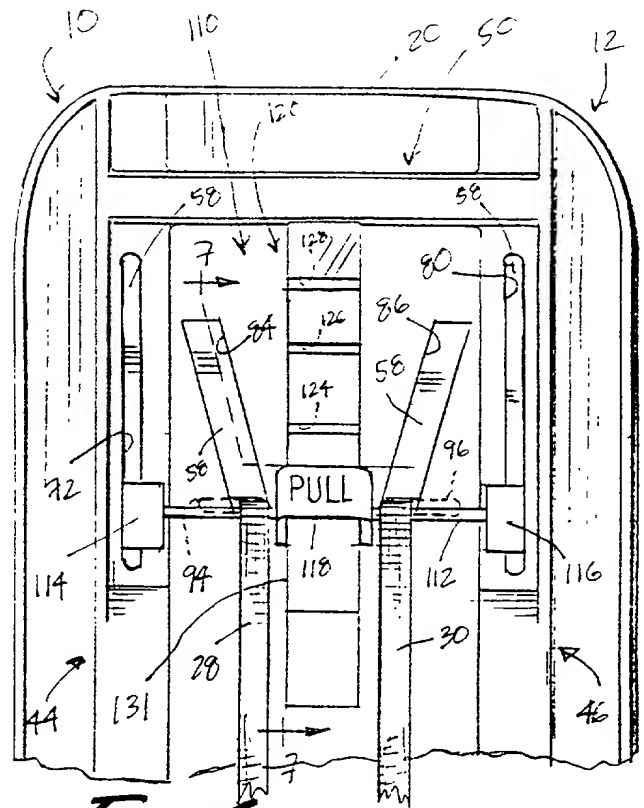
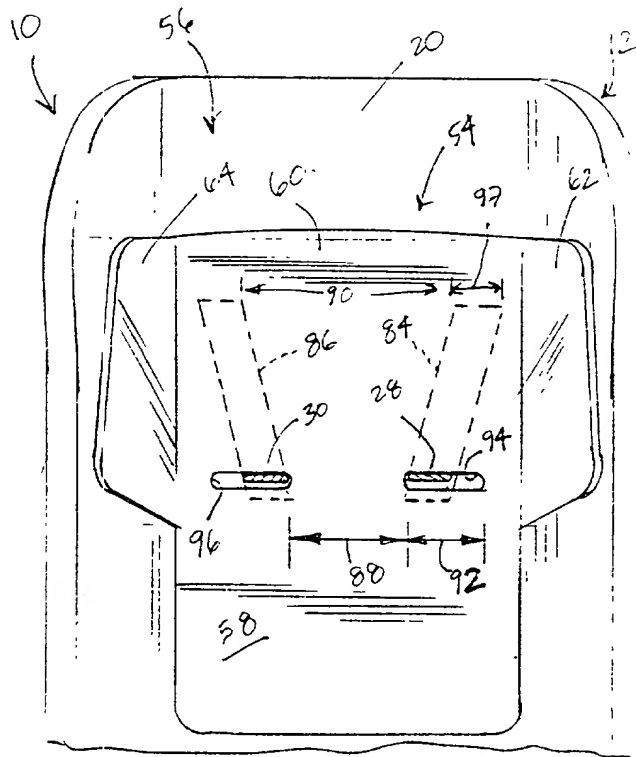


FIG. 5

FIG. 6

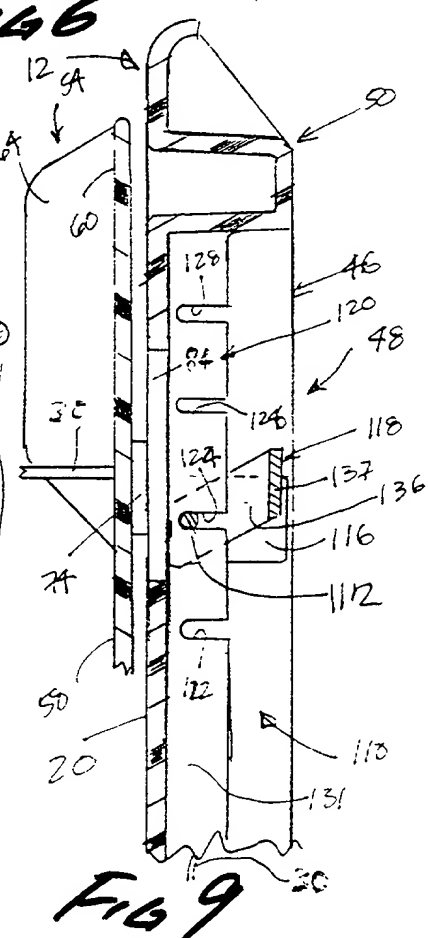
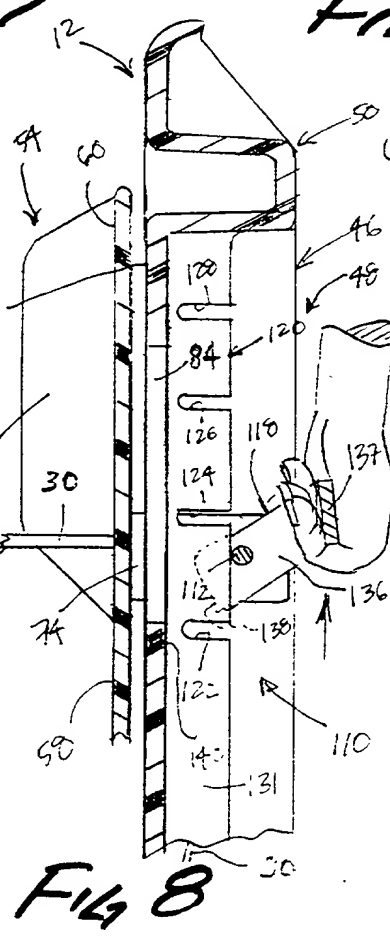
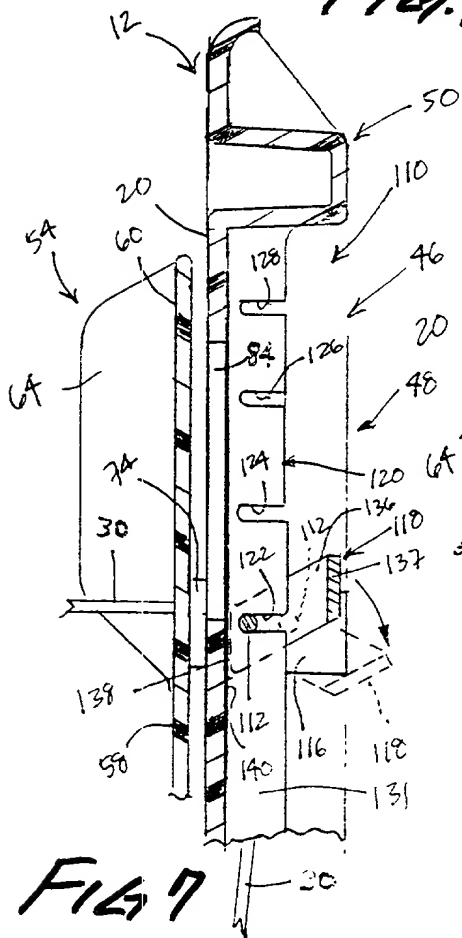


FIG. 7

FIG. 8

FIG. 9

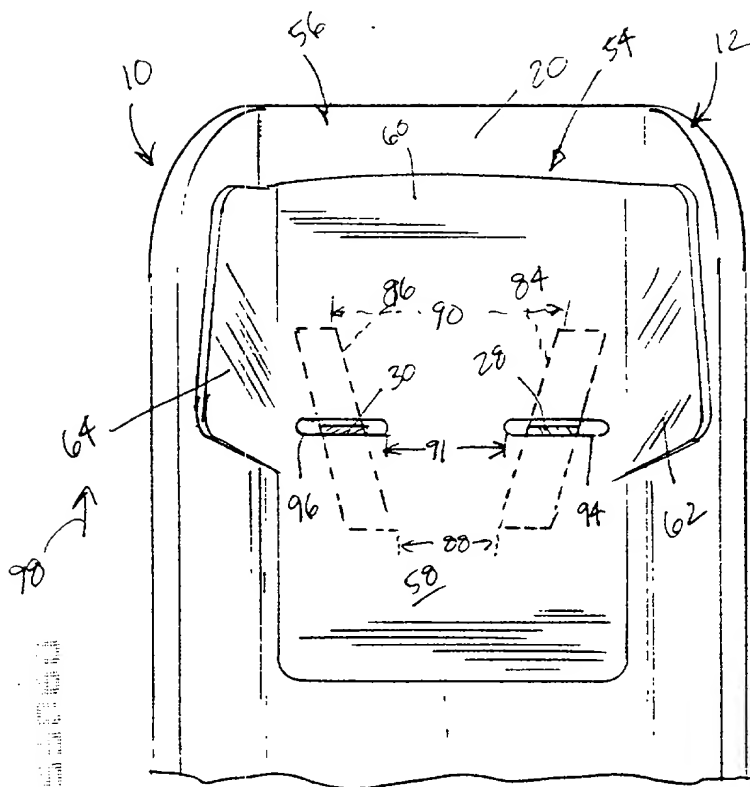


FIG 10

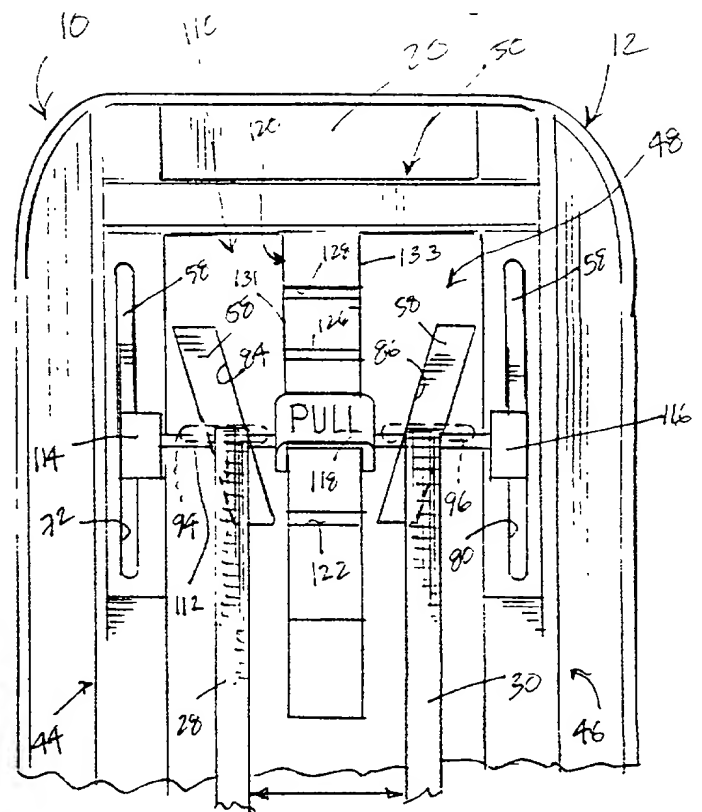


FIG 11

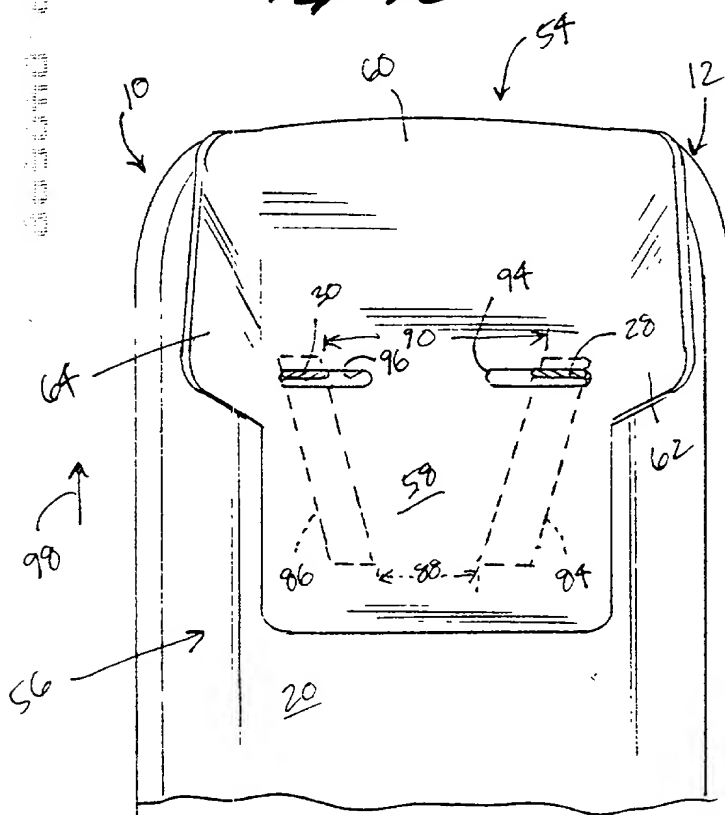


FIG 12

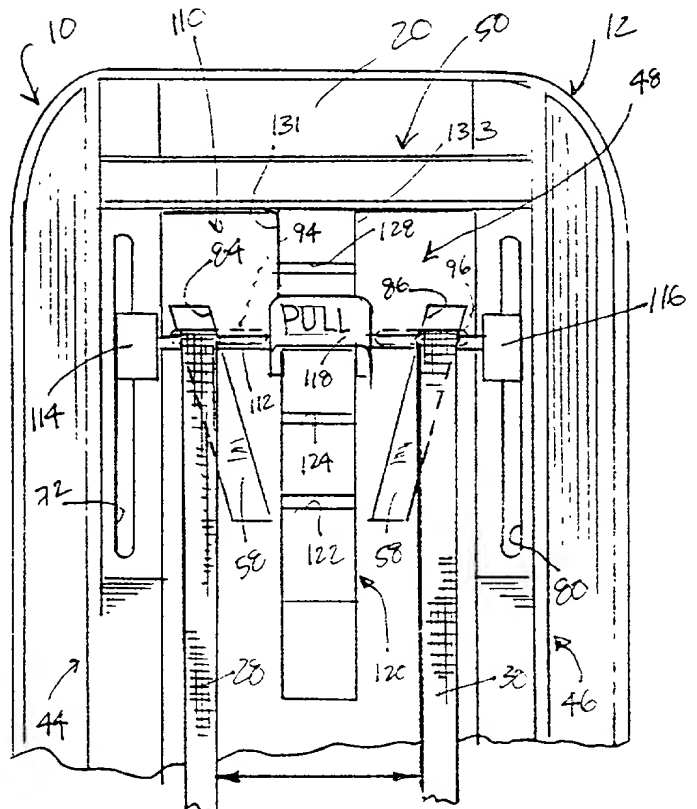


FIG 13

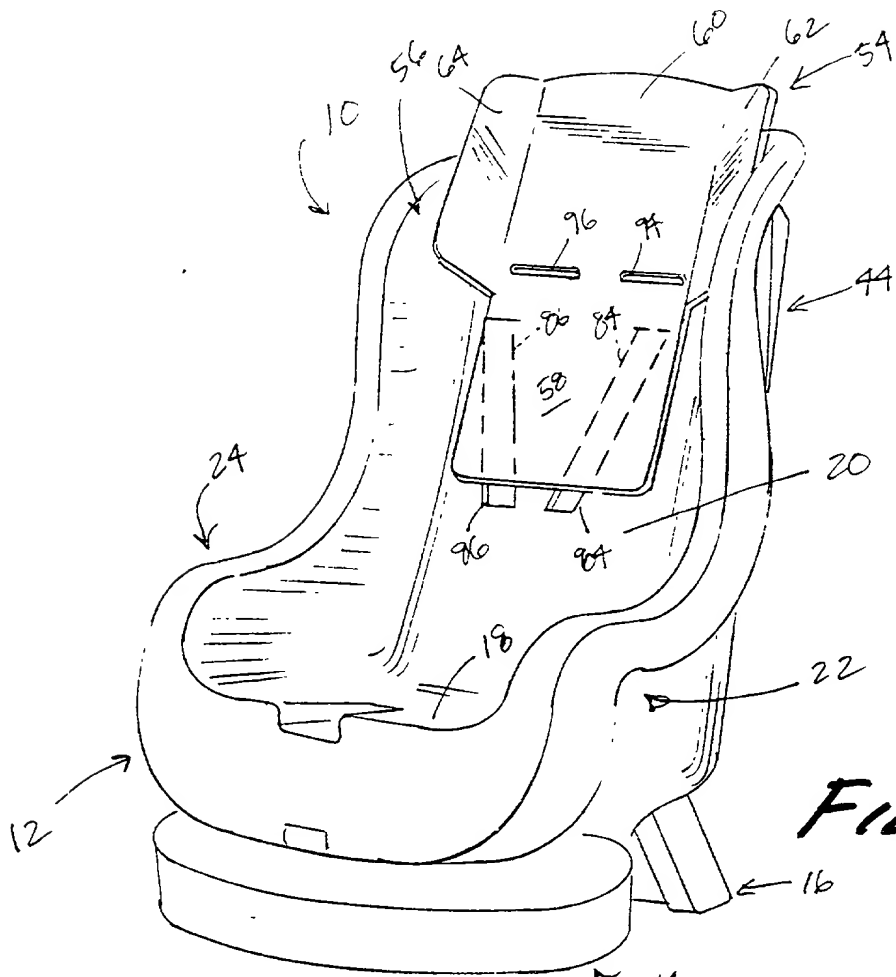


Fig 14

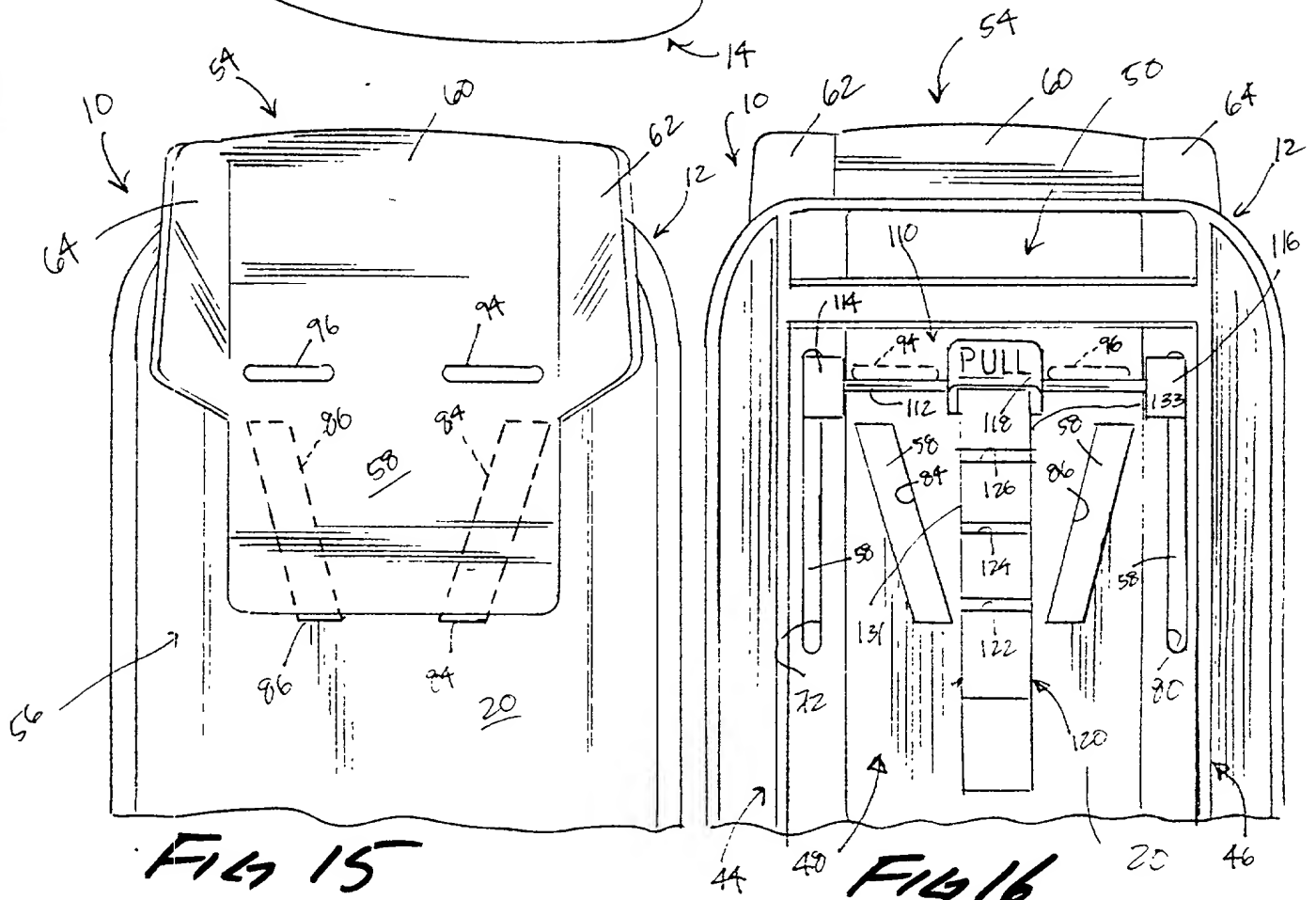


Fig 15

Fig 16

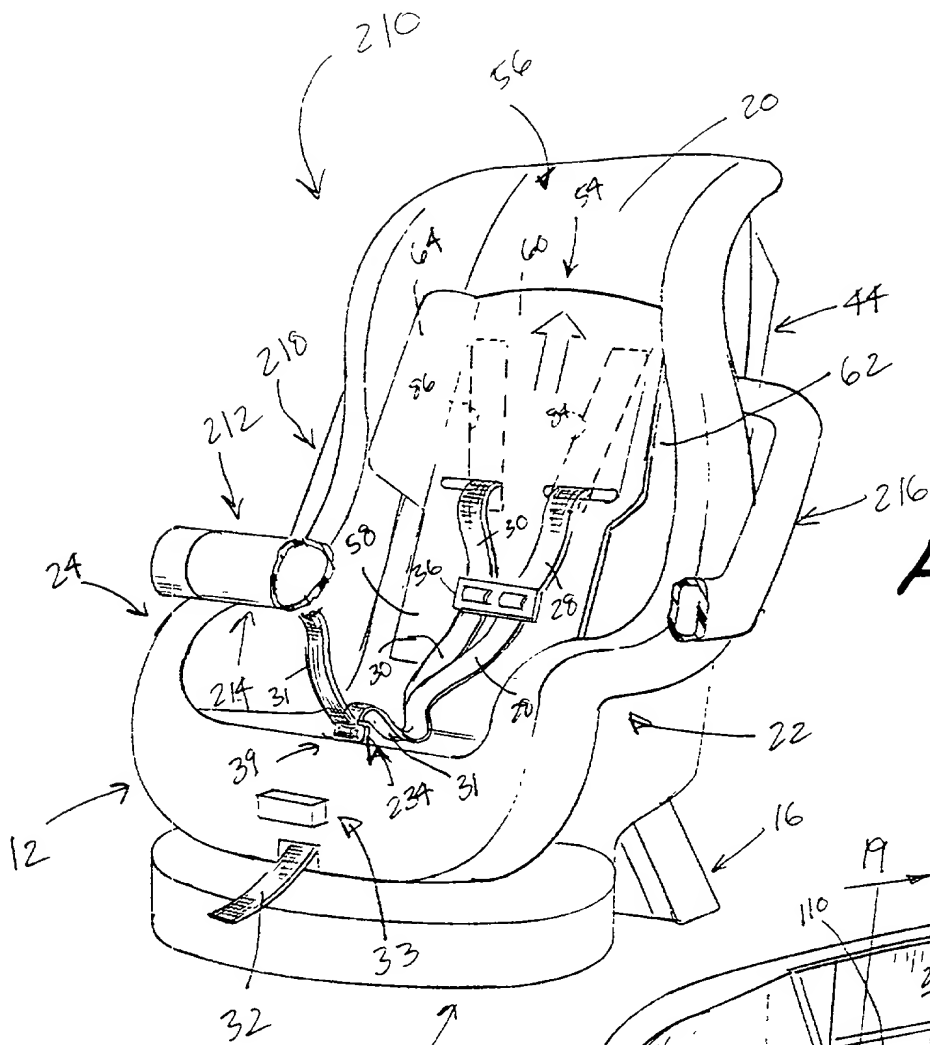


Fig 17

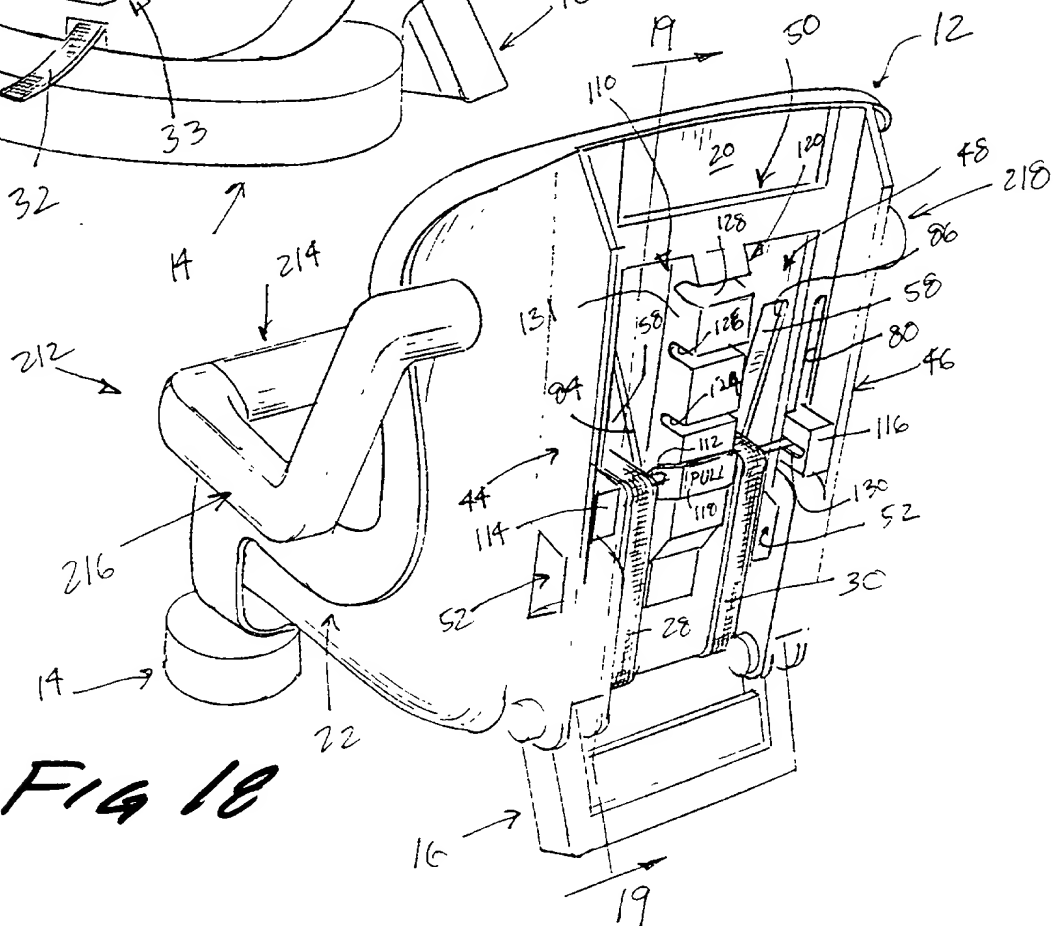


Fig 18

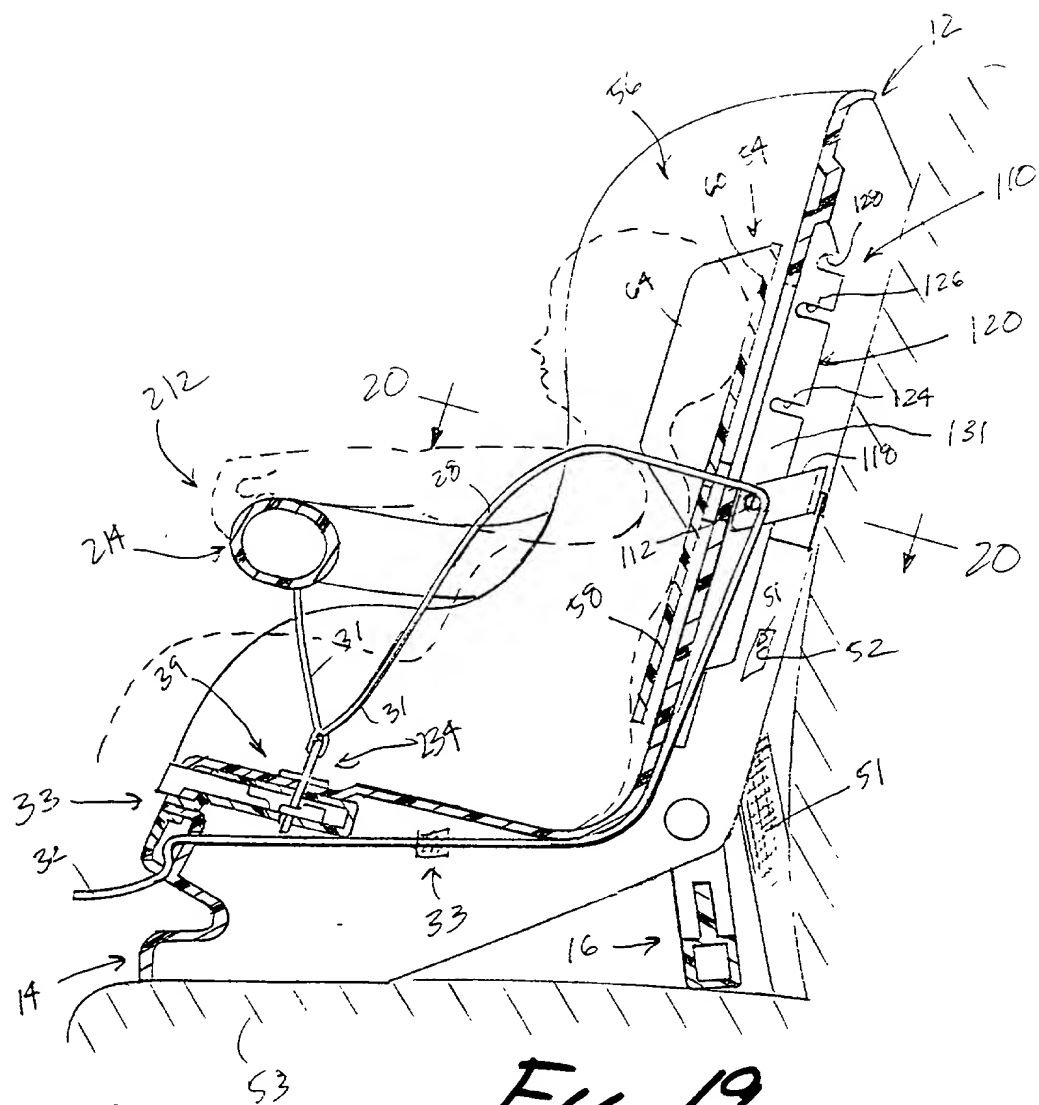


FIG. 19

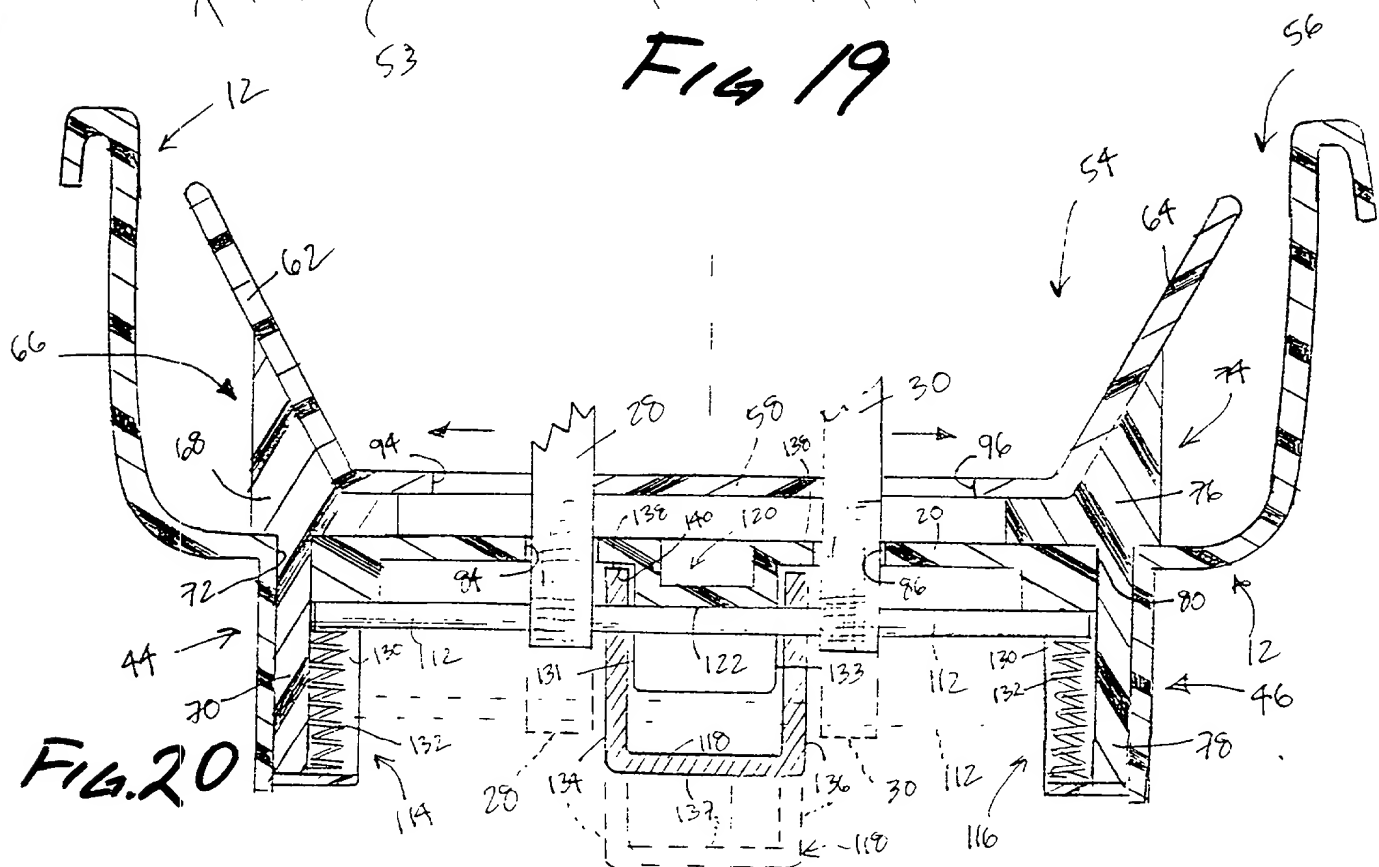


FIG. 20

Attorney Docket No.: 3168-29779

Cosco Case CO-592

DECLARATION AND POWER OF ATTORNEY -- PATENT APPLICATION

As a below named inventor, I hereby declare that I believe I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter which is claimed and for which a patent is sought in the application entitled:

CHILD VEHICLE SEAT WITH CHILD-RESTRAINT HARNESS ADJUSTMENT MECHANISM, the
specification of which
(*check one*) X is attached hereto
_____ was filed on _____ as
United States Application Serial No. _____ or
PCT International Application No. _____
and was amended on _____
(if applicable)

I hereby declare that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to herein.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate on which priority is claimed (as listed below) and I have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(b) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

<u>60/041,914</u> (Application Serial No.)	<u>April 7, 1997</u> (Filing Date)	<u>Pending</u> (Status-patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status-patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status-patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status-patented, pending, abandoned)

I hereby appoint William R. Coffey, Reg. No. 24023; Jerry E. Hyland, Reg. No. 20904; Richard D. Conard, Reg. No. 27321; Steven R. Lammert, Reg. No. 27653; Richard A. Rezek, Reg. No. 30796; Timothy E. Niednagel, Reg. No. 33266; John P. Breen, Reg. No. 38833; Jill L. Werling, Reg. No. 39874; Nancy J. Harrison, Reg. No. 27083; R. Trevor Carter, Reg. No. 40549;

Perry Palan, Reg. No. 26213; Mark M. Newman, Reg. No. 31472; Bobby B. Gillenwater, Reg. No. 31105; Paul B. Hunt, Reg. No. 37154; Michael S. Gzybowski, Reg. No. 32816; and Robert D. Null, Reg. No. 40746, as attorneys of record with full power of substitution and revocation, to prosecute this application, and to transact all business in the Patent and Trademark Office connected therewith, and I specify that communications regarding the application be directed to:

BARNES & THORNBURG
11 South Meridian Street
Indianapolis, Indiana 46204
Telephone (317) 236-1313

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

James M. Keim	USA
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Full Name of Third Joint Inventor, if any	Country of Citizenship
Third Inventor's Signature	Date
Residence and Post Office Address	
Full Name of Fourth Joint Inventor, if any	Country of Citizenship
Fourth Inventor's Signature	Date
Residence and Post Office Address	

Additional inventors to be similarly identified on attached sheet.